VI. Statewide Results

The measures of supply and demand provide a valuable picture of the higher education system in Washington as it exists today and critical areas for growth to meet student, employer, and community demand for postsecondary education into the future.

Education Supply

The current budgeted and actual enrollments for the public colleges and universities and the current enrollments for the private universities are reported in Table 1. The table also includes an estimate of the capacity for additional students at public and private colleges and universities. The FTE capacity estimates at the four-year public institutions used in this report are based on the HECB de facto enrollment capacity estimates. These estimates consider existing or planned classrooms, class labs, and faculty offices, as well as constraints in enrollment growth due to regulatory, geophysical, or cultural factors.

The higher education system in Washington currently serves 273,942 FTE students (2003-2004 FTE enrollments).[9] Roughly one-third of these students attend the public four-year institutions in Washington and about half of the total enrollment is accounted for by enrollments in the public community and technical college system. Just under 12 percent of the total enrollment in the public colleges and universities is nonresident. Out-of-state enrollment is highest at the graduate level, with 47 percent of graduate and professional students coming from out-of-state. The four-year public colleges and universities attract 13 percent of their undergraduate students from out-of-state, while the two-year public colleges attract less than five percent of students from out-of-state.

The figures for the public four-year colleges and universities indicate that all institutions have some capacity for additional FTEs, provided appropriate operating and capital funding is allocated. However, the regional colleges and universities are more limited in the number of students they would be able to add than are the research universities and branch campuses. The regional four-year institutions could add a combine total of 7,422 FTEs, or 24 percent, at their main campuses if they grow to full capacity. The research universities could add an additional 11,473, or 23 percent, at their main campuses and 12,821, or 283 percent, at the branch campuses, for a total possible growth in existing four-year institutions of 31,716 FTE, or 37 percent. While the HECB does not have an estimated growth limit for the community and technical college system, the data suggest that the system has been operating well beyond current capacity. For example, based on HECB utilization standards, the community and technical college system currently has classroom space to accommodate 84,122 students, yet the system enrolled 138,241 students in 2003-2004. Throughout the system, additional growth could be accommodated through expansion of off-campus centers and teaching sites and increased delivery of coursework and programs through distance education.

[9] Enrollments reported do not include self-support and contract enrollments at the public colleges and universities.

Two estimates of possible growth are shown for the subset of private institutions that are members of the Independent Colleges of Washington (ICW). The first estimate is based on responses to a capacity survey conducted by the HECB. The second estimate is possible growth in targeted academic areas at ICW schools, provided state financial aid grows proportionally to fund the additional students. The growth estimates for the remaining private institutions are based on responses to the HECB survey. In total, the private colleges and universities could add between 10,948 to 16,626 additional FTEs (a growth of 26-39 percent) to the state's higher education capacity.

Table 1
Institutional Funding, Enrollments, and Capacity

Institution	State Funded FTE (2003–2004)	Actual FTE (2003-2004)*	Capacity (Planned Growth and/or Institutional Growth Limits)
Central Washington University	7,809	U Grad 8,289 Grad 368 Total 8,657	9,819
Eastern Washington University	8,150	U Grad 7,939 Grad 1,017 Total 8,956	11,175
The Evergreen State College	3,871	U Grad 3,848 Grad 251 Total 4,099	5,000
University of Washington	32,458	U Grad 23,479 Grad 9,947 Total 33,426	38,410
University of Washington, Bothell	1,235	U Grad 1,080 Grad 170 Total 1,250	6,000
University of Washington, Tacoma	1,494	U Grad 1,312 Grad 267 Total 1,579	5,901
Washington State University	17,479	U Grad 14,477 Grad 3,497 Total 17,974	23,000
Washington State University, Spokane	616	U Grad 133 Grad 494 Total 627	n/a
Washington State University, Tri-Cities	633	U Grad 441 Grad 236 Total 676	1,799
Washington State University, Vancouver	1,162	U Grad 957 Grad 305 Total 1,262	3,645
Western Washington University	11,242	U Grad 10,885 Grad 620 Total 11,505	12,500
Private Not for Profit (ICW)**	n/a	29,977	33,299** – 38,977***
Private Not for Profit (Other)**	n/a	5,752	8,432
Private For Profit**	n/a	6,597	11,543
Community & Technical Colleges		138,241	n/a
Private Two-Year or Less	n/a	8,001	n/a

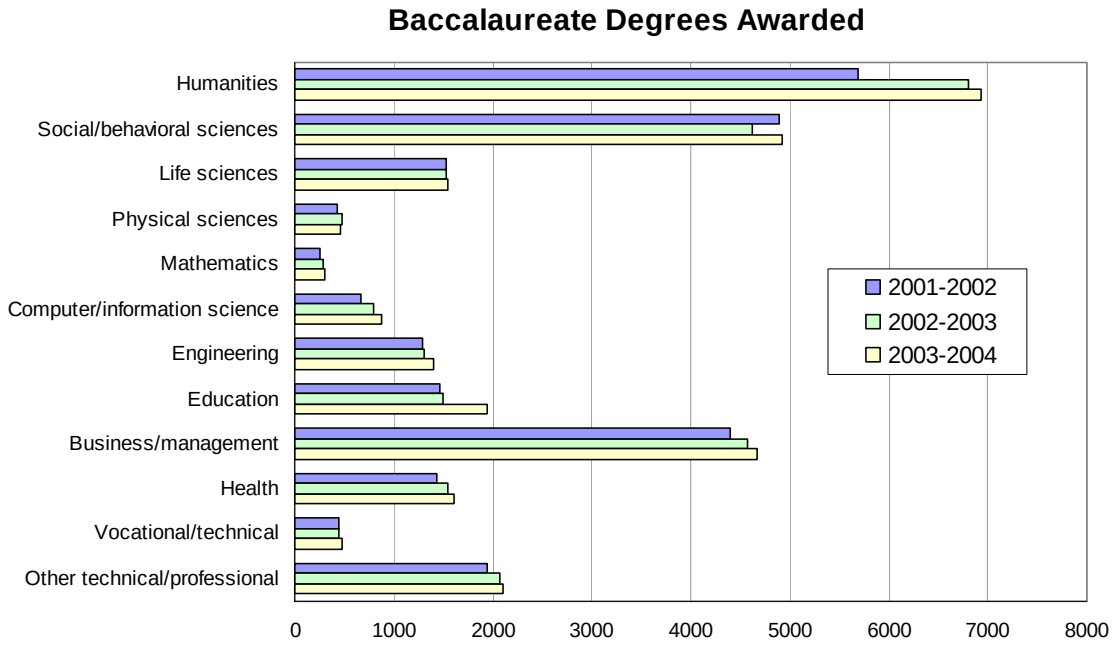
*Enrollments reported do not include self-support and contract enrollments at the public colleges and universities.

**Estimates based on spring 2004 HECB Survey of Private Institutions in Washington State. FTE enrollment estimates for 2002-2003 academic year. Capacity based on projected FTE in 2009-2010 academic year.

***Possible growth in ICW schools between 2004-2005 and 2012-2013 given increases in state financial aid to fund additional students. Based on ICW Capacity Survey 2004.

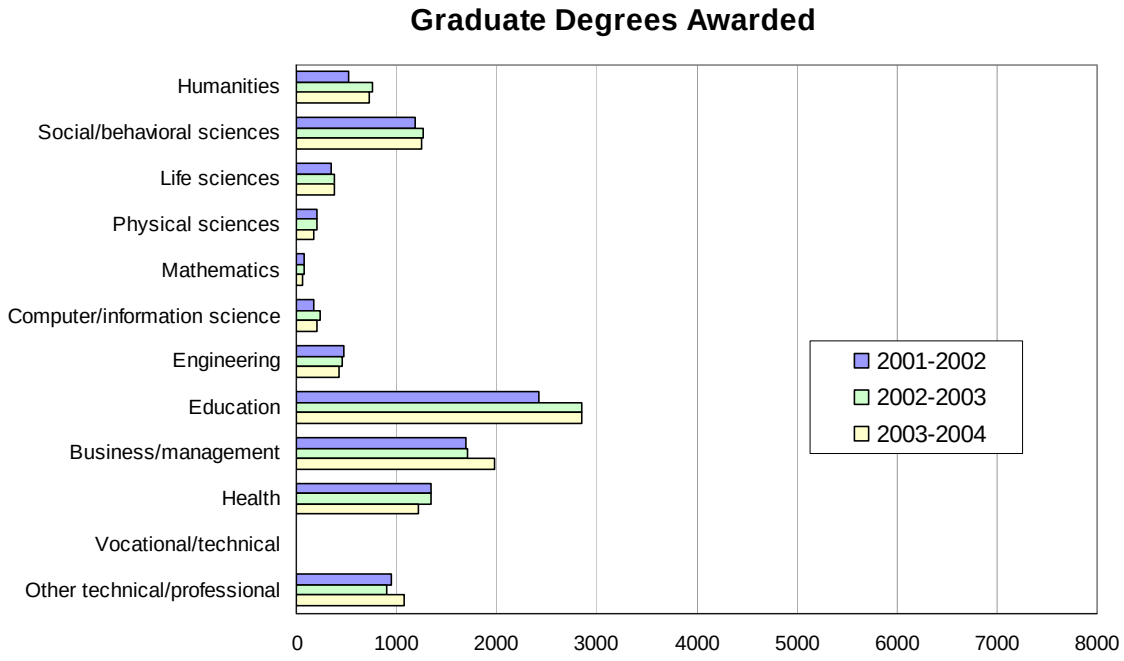
The total number of bachelor's degrees produced in Washington has increased in the past three years, from 24,457 in 2002 to 27,240 in 2004. At the baccalaureate level, the most notable increases occur in the humanities (which includes liberal arts and sciences), education, and computer science, with growth of 22 percent, 33 percent, and 30 percent, respectively. Math and health majors also saw double digit increases in the number of degrees awarded over the past three years. Life sciences and social/behavioral sciences were relatively flat; all other majors grew between six percent and eight percent over the three year period, from 2002 to 2004 (see Figure 1 below).

Figure 1
Degrees Awarded by Broad Academic Area
(See Appendix B-1 for a listing of academic programs included under each heading)



Graduate degrees exhibited greater variation over the three year period. Overall, 981 additional graduate and professional degrees were awarded in 2004 over the 2002 level, an increase of nine percent. Growth was especially robust in humanities (38 percent), computer science (22 percent), education 18 percent), and business (17 percent). Graduate and professional degrees classified in "other technical/professional degrees" increased by 13 percent, which was accounted for primarily by 116 additional professional and masters degrees in law. The number of graduate degrees produced in math, physical science, health, and engineering declined by 18 percent, 13 percent, 9 percent, and 8 percent, respectively (see Figure 2).

Figure 2

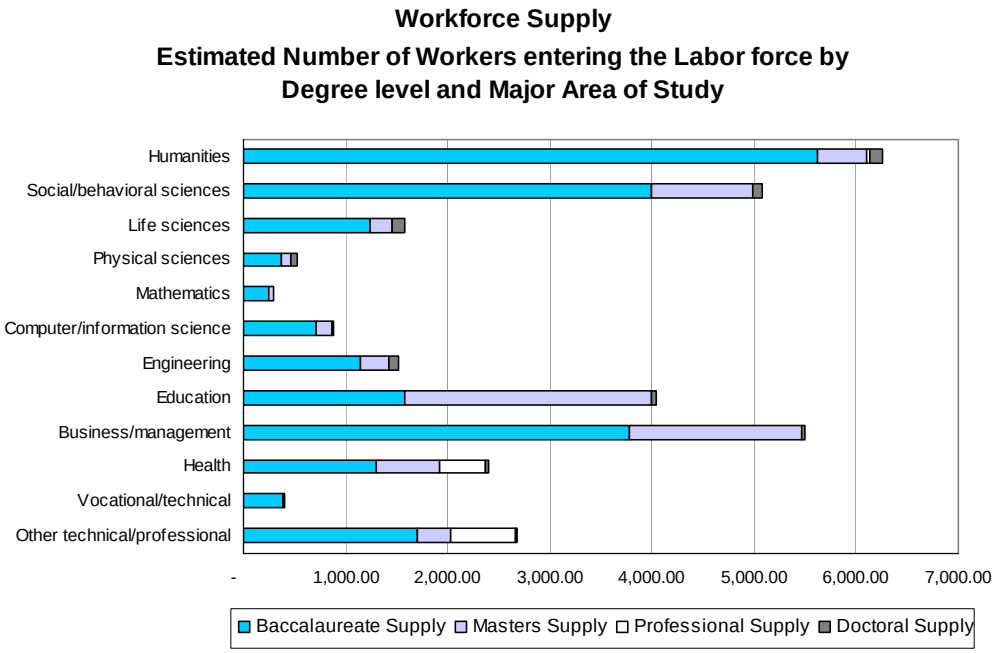


Workforce Supply

Workforce supply is a measure of the number of prepared workers available to take positions in the workforce. Because not all graduates enter the labor force immediately, the workforce supply in less than the annual number of degrees produced in a given academic field. Baccalaureate graduates who do not enter the workforce and those who enroll in graduate school full-time are excluded from the estimate of workforce supply; the remaining 81 percent of baccalaureate graduates are included in the baccalaureate workforce supply estimate. The number of graduate degree recipients is reduced based on labor force participation rates by degree level. On average, 87 percent of graduate degree recipients are estimated to enter the workforce. The supply of workers does include graduates of Washington institutions who are not residents of Washington, including international students. International students account for 3.1 percent of undergraduate degrees awarded in Washington and 9.3 percent of graduate degrees.

Workforce supply estimates are summarized by major field of study and degree level in Figure 3. The figure shows that professional degrees are concentrated in health fields and "other technical/professional." All of the professional degrees in the "other" category are due to the inclusion of law degrees in this category. The majority of master's degrees (56 percent) are produced in education and business.

Figure 3



Demand

Three estimates of demand are used in the assessment. Student demand is an estimate of the number of students who are expected to enter the higher education system. Employer demand is the number of workers, including the training level and major area of study, required to meet employers' demand for workers. Finally, community demand brings in additional information from a variety of sources to assess the demand for education expressed by community constituents.

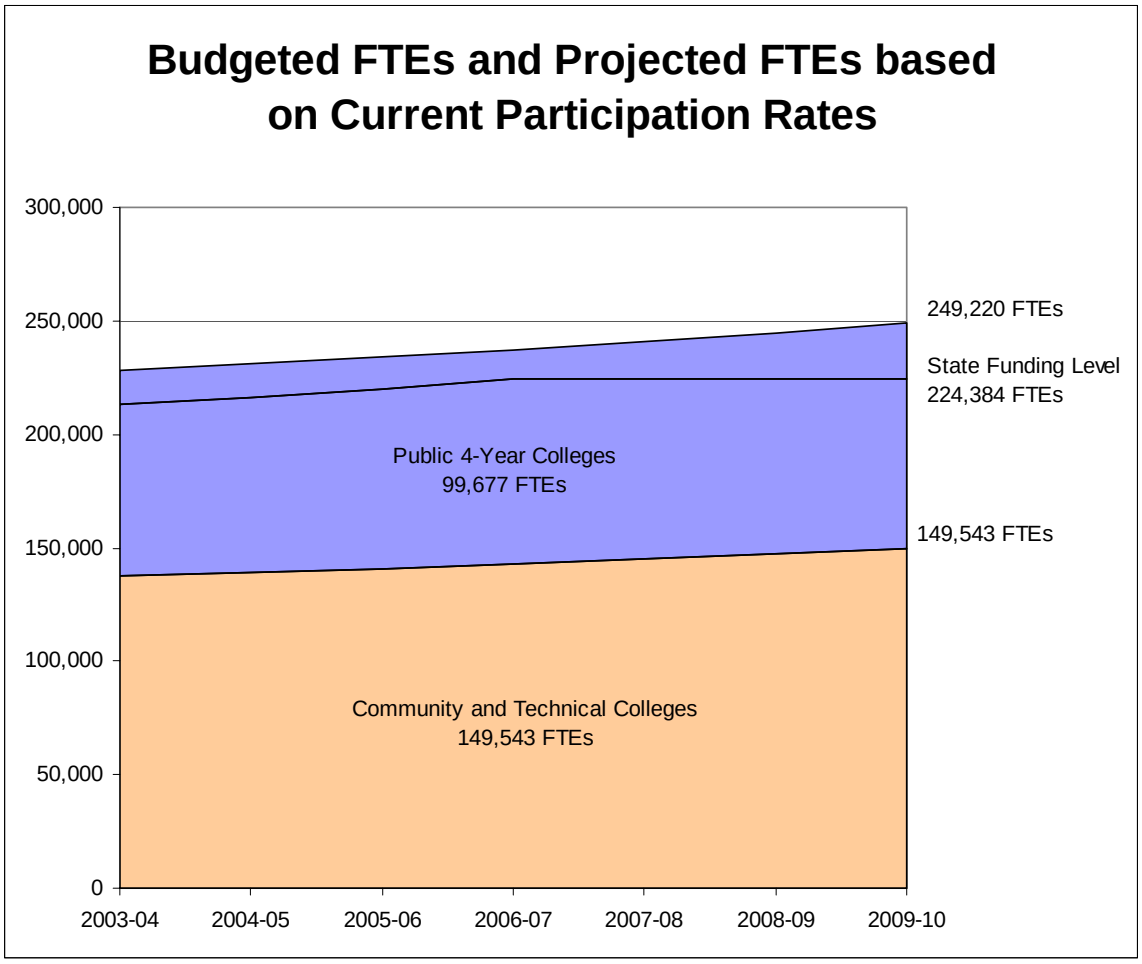
Student Demand

Two approaches to estimating student demand are used in the statewide estimates. First is the traditional approach used in Washington which is to estimate the total number of FTEs in the system at a future year based on the current level of service. This is done by applying the current college participation rate to state population projections in order to estimate the size of the system if current participation rates were carried forward into the future.

In the *2004 Strategic Master Plan for Higher Education,* the HECB took a new approach to project student enrollments. Rather than base projections on historic participation, the HECB approach is to project the number of degrees awarded based on historic trends then back into an estimate of enrollments based on historic FTE/degree ratios. Finally, the report will include a discussion of impacted majors where projections may under-estimate actual demand due to

limited participation resulting from enrollment caps or other structural impediments to student enrollment.

Figure 4



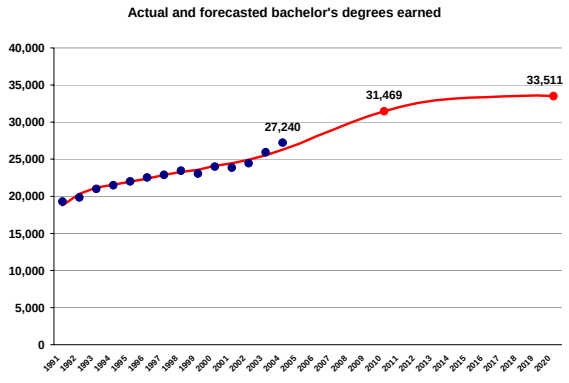
Based on current participation rates, enrollments would be expected to grow to 99,677 FTE in the public four-year system and 149,543 in the public two-year system, for a total of 249,220 students in 2010, an increase of 21,041 students over 2004 actual enrollment levels[10] and 24,836 over 2006-2007 budgeted enrollment levels.

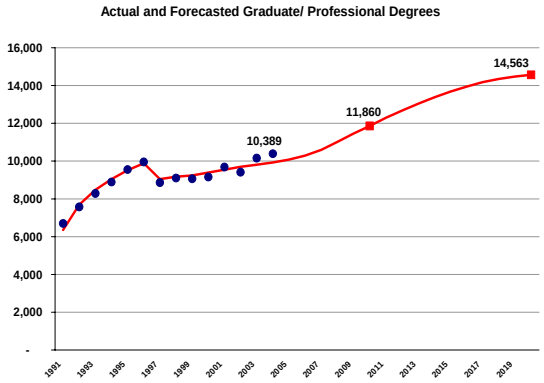
[10] Note: Estimates based on current participation rates are higher than the latest OFM estimates (May 2005) due primarily in a difference in the base year. (HECB estimate uses 2003-2004 while the most recent OFM estimate uses 2004-2005 estimate.) Because enrollment in the community and technical colleges was significantly lower in 2004-2005, the total estimate is also reduced. Enrollment figures include only state funded FTEs.

The number of degrees awarded has shown an upward trend over the past 14 years. Based on this trend, the HECB projects student demand for degrees of 31,469 by 2010 and 33,511 by 2020. Graduate degree awards have shown a similar upward trend; HECB estimates 11,860 graduate and professional degree awards in 2010 (see Figure 5).

Figure 5

Actual and Forecasted
Bachelor's and Graduate/Professional Degrees Earned





Estimates of the number of degree awards are used to estimate the system FTE required to produce those degrees (see Figure 6). The analysis yields an estimated total system size of 326,692 FTE by 2010, an increase of 52,750 over 2004 enrollment levels. Of this total, 44,562 additional FTEs would be in the public sector[11] with 26,889 in the two-year colleges and 17,672 in the four-year colleges.[12] The projected increase over current enrollment would be 8,188 in the private sector. While there is sufficient capacity in the public and private four-year colleges and universities to accommodate estimated demand (provided appropriate capital and operating funding is provided for the four-year public institutions and proportional growth in state financial aid programs for the privates), expansion in the two-year sector is a greater concern as the 2004 enrollment levels were already well beyond capacity. While a portion of the expected growth may be met with greater expansion of the four-year public institutions and/or private institutions, it is important to note that the community and technical colleges provide a range of education and training programs, only about 40 percent of the enrollments are in the "academic transfer" programs with curricula similar to that offered in lower-division coursework at the four-year public institutions. Additionally, statewide capacity does not translate into capacity in the right place so the regional profiles included in the next section will be important in understanding access in regions of the state.

[11] Based on results of the HECB survey of expected growth of the private colleges, the growth in enrollments at the private institutions is expected to keep pace with growth in the public sector; therefore, the ratio of enrollments in public and private institutions is assumed to remain constant over the period of the projections.

[12] Due to over-enrollments in the public colleges and universities, the actual increase over 2006-2007 budgeted enrollments would be 48,481.

Figure 6

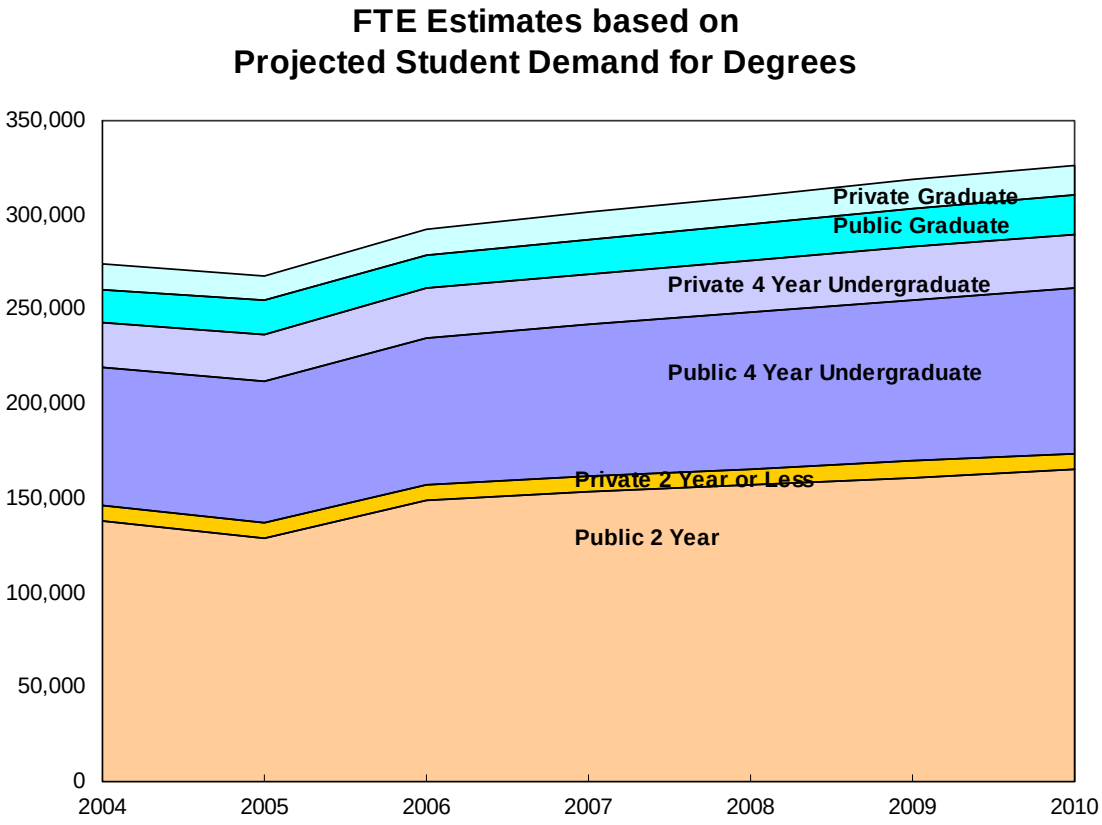
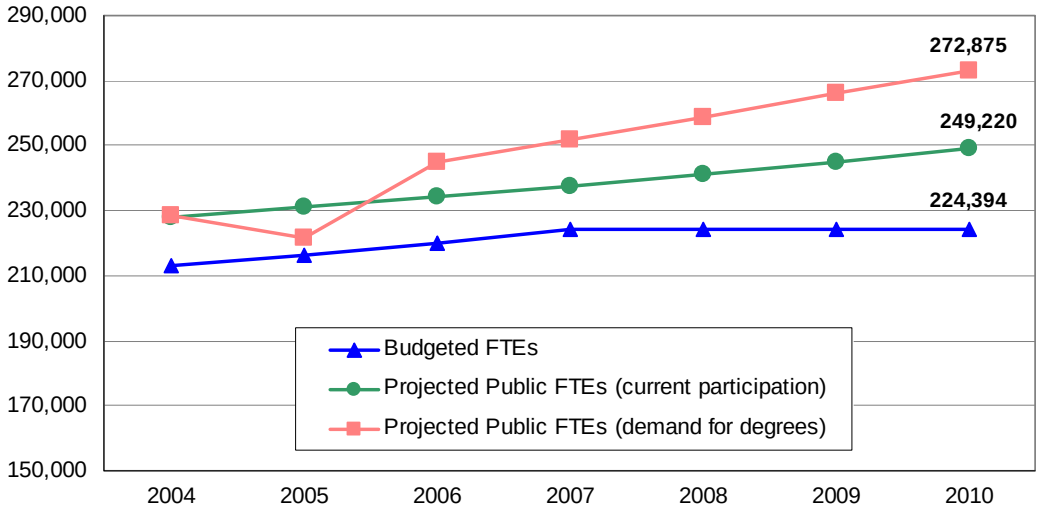

FTE Estimates based on
Projected Student Demand for Degrees
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
2004
2005
2006
2007
2008
2009
2010
Private Graduate
Public Graduate
Private 4 Year Undergraduate
Public 4 Year Undergraduate
Private 2 Year or Less
Public 2 Year

Figure 7

Budgeted and Projected Public College and University FTEs



While budgeted FTEs have been increasing, they are not growing fast enough to catch up with projected enrollments based on the current level of population growth or demand for degrees (see Figure 7).

Specific majors identified by institutions as "impacted" or "competitive" are those majors in which student demand is consistently greater than space available in the programs. Often these programs have specific prerequisite coursework required for admission and, in some cases, entry into a major will be based on a competitive admission process. Majors identified by institutions include architecture, business, communications, computer science and informatics, engineering, elementary education, nursing, and psychology.

Employer Demand

Employer demand is defined as the annual number of net job openings by occupation. Two measures of demand are reported. Entry-level demand is based on the standard Bureau of Labor Statistics (BLS) training levels assigned to all occupations. Ultimate demand is based on HECB analysis of the training levels of the existing workforce (based on 2000 U.S. Census data). The HECB approach assumes the BLS level is the minimum training level for entry into an occupation and census data is used to assess the degree to which workers in a given occupation hold a degree at a level higher than the minimum. To simplify the discussion, this will be referred to as additional training. However, it is important to note that for many occupations there is not a neat progression or sequence to training. In fact, there are several training pathways for entry into occupations and/or varying incentives and pathways to receive additional training once employed in the occupation. The analysis can provide a range of training needs for

an occupation, but it cannot distinguish between training before entry and training received while working in the profession. An additional complexity is that, in some instances, additional training may move a worker from one occupation to another, especially in occupations requiring less training. The HECB analysis accounts for this by assuming a ceiling for the training level of those occupations requiring short-term or little formal training (see Appendix A for a more detailed discussion of the HECB analysis).

As shown in Figure 8, the HECB approach estimates fewer workers with lower training levels and more workers with higher levels of training. These differences are a reflection of the factors discussed above. While the BLS estimates assume all positions in a given occupation require a single training level, the HECB approach reflects the actual workforce. Workers may enter with a higher level of training than assigned by BLS or they may gain additional training. For example, a worker may enter with short-term training then move to mid-level over time by completing an associate degree. At the same time, workers with an associate degree may complete a bachelor's degree and thus move up a category.

Figure 8

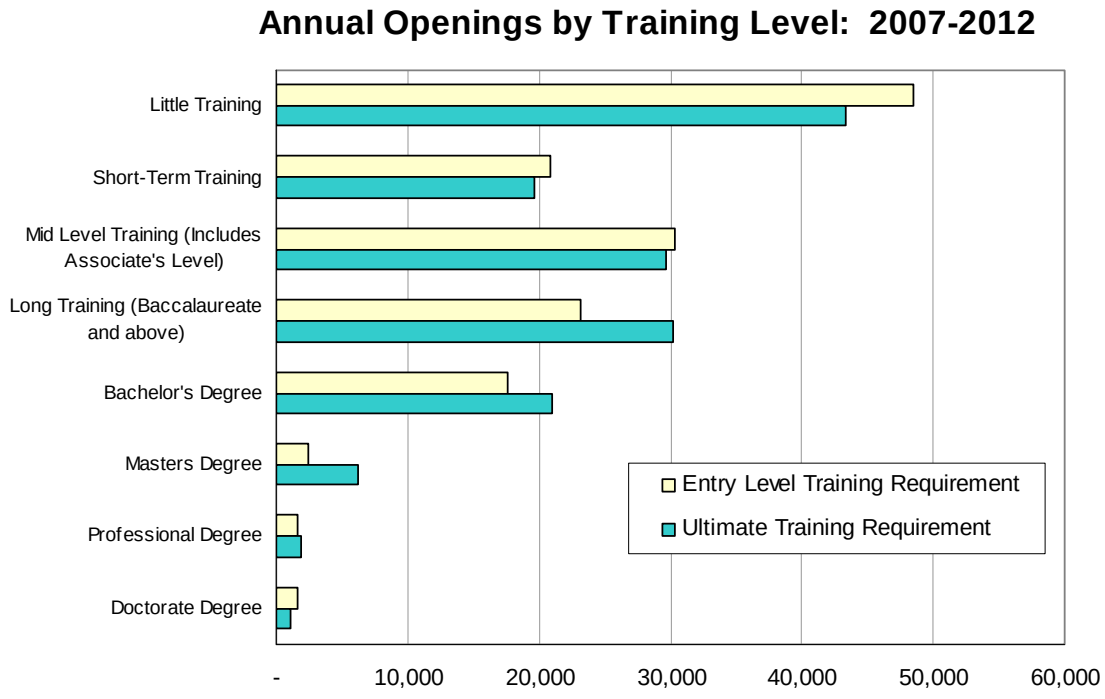


Figure 9 shows the number of workers requiring a bachelor's degree for entry to occupations and as an ultimate training requirement. A number of occupations have substantial additional training requirements as measured by the gap between entry requirement and ultimate training requirement. In many cases, workers will enter the occupation with the higher level of training;

in other cases, the workers will need to seek additional education. Health care practitioners and technical occupations stand out as an area where a substantial number of workers enter the occupation with a bachelor's or complete a bachelor's while working when less than a bachelor's is required using the BLS training level. Baccalaureate training for nurses accounts for 47 percent of the difference between entry and ultimate training requirements. The training requirement for nursing, according to the BLS, is an associate degree; however, a substantial number of nurses go on to receive a bachelor's degree (and in many cases higher degrees) while working and a significant portion of new nurses receive their training and licensure through a baccalaureate level program rather than an associate level program.

Also within the broad area of health care practitioners and technical occupations, 79 percent of clinical and medical lab technologists and technicians enter with a bachelor's degree or higher or earn a degree and continue employment in the occupation.

Figure 9

Projected Annual Openings for Workers with Baccalaureate Degree or Higher, by Occupation: 2007-2012

Source: HECB Estimate Based on May 2005 Employment Security Projections

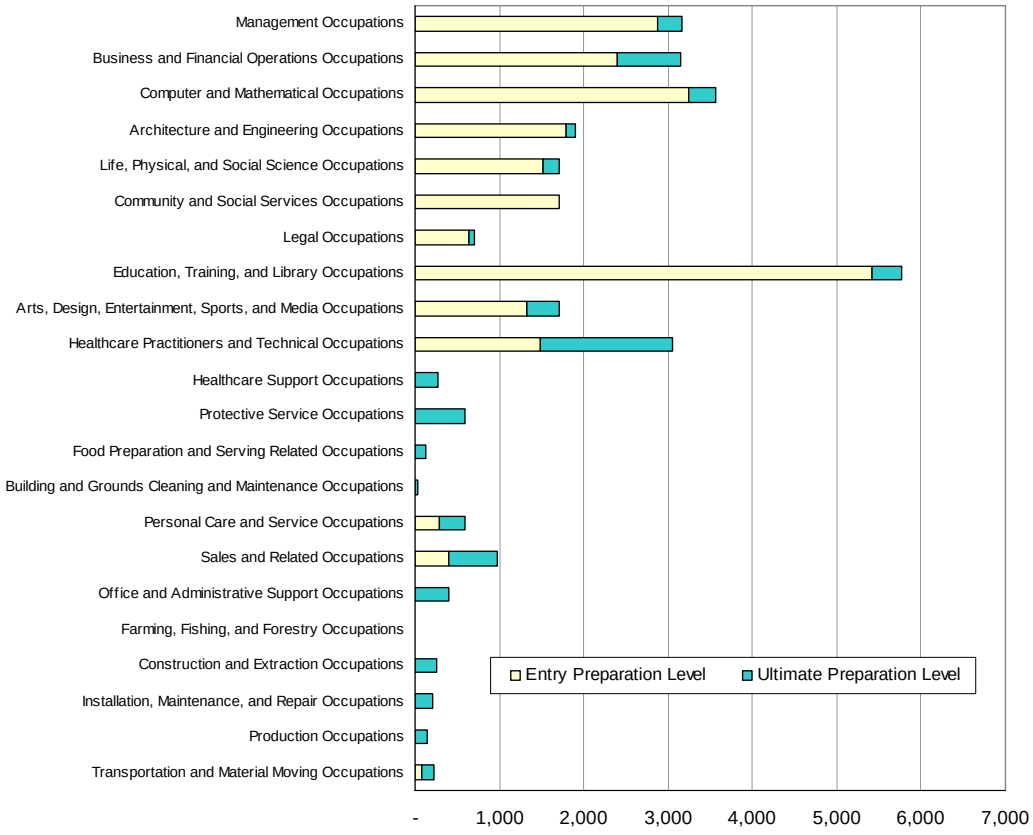
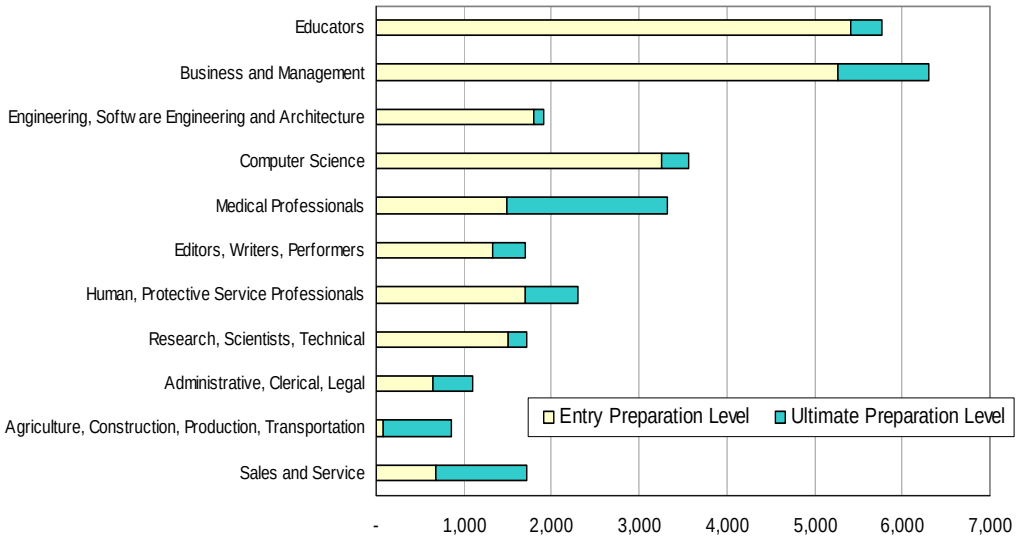


Figure 10 provides the same information aggregated into the groupings used in later analysis. Medical professions again stand out as an area with significant need for higher levels of training. Also evident is a high proportion of openings in agriculture, construction, production, transportation, and sales and service occupations requiring higher levels of training. While these are dispersed across a variety of industries and occupations, most of the positions that require higher levels of training are supervisory and/or highly technical (e.g., pilots, air-traffic controllers, insurance, securities, commodities, and financial services sales agents).

Figure 10

Projected Annual Openings for Workers with a Baccalaureate Degree or Higher, by Occupation: 2007-2012



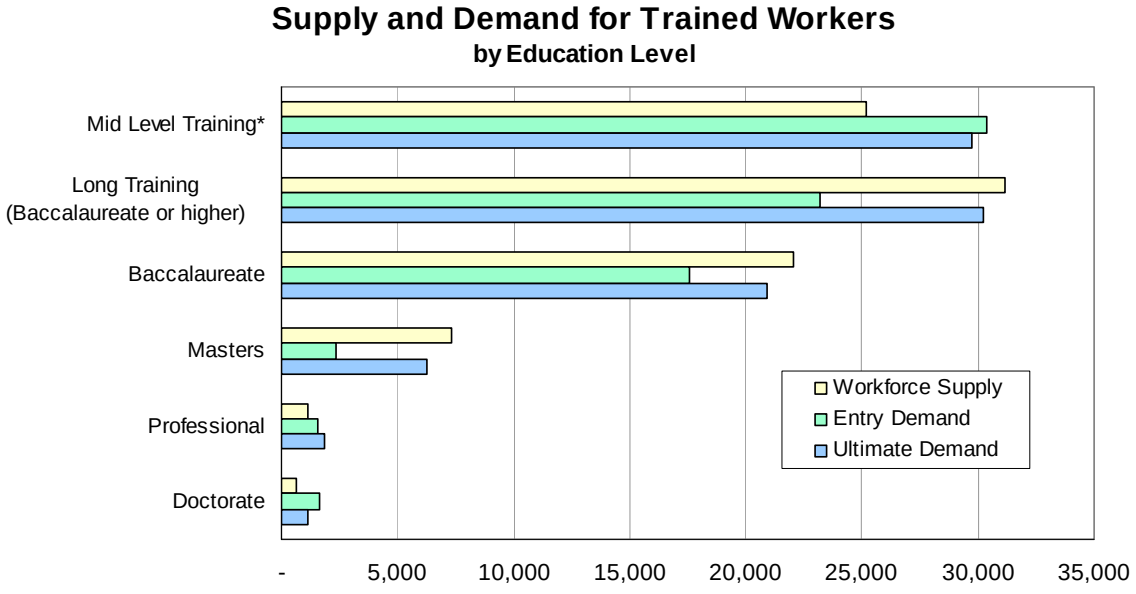
Matching Workforce Supply and Employer Demand

The analysis of the labor market demands of employers in Washington and the supply of workers prepared in Washington institutions and training programs takes into account our best estimate of the training needs for specific occupations and does not fully consider other aspects of demand for degrees and programs, including employer preferences, student demand, or community demand. Over the past several years, Washington has experienced a net inflow of workers. Workers migrating to the state tend to have, on average, higher levels of educational attainment and often are recruited to work in specialized technical areas. An aggregate match of workforce supply and employer demand shows that total workforce supply (annual graduates entering the workforce) is roughly equal to employer demand for 2007-2012 as indicated using estimates of training needs by occupation. As the disaggregated analysis will show, the analysis does explain the inflow of workers prepared in a variety of technical and professional specialties, but it does not explain the net inflow of workers prepared at the baccalaureate level and beyond. For example, if the state were preparing the appropriate number of bachelor's degrees in the wrong

fields, then we would expect a net migration of zero with workers entering the state with credentials that are in demand and workers leaving the state whose qualifications are not in demand. In fact, we see workers entering the state who are prepared for work in high-demand occupations, and substantial numbers of other workers remaining in the state to work in positions that may or may not require a bachelor's degree as a minimum qualification, but employers appear to value the qualification. As a result, the analysis of supply and demand will focus on the disaggregated data with an emphasis on those occupational areas that show the greatest need for additional graduates at the baccalaureate level or higher.

Demand in specific occupations is not met by current supply. Matching with the ultimate demand measure, current degree production only meets 67 percent of the need in engineering, software engineering, and architecture and 56 percent of the need in computer science. Current degree production is sufficient to meet 65 percent of the need for additional training in the medical professions, 75 percent of the need in editing, writing and performing occupations, and protective service occupations, and 89 percent of the need in research, scientific, and technical occupations. Demand for degrees is being met (or exceeded) in administrative, clerical, and legal occupations, agriculture, construction, production, and transportation occupations, and sales and service occupations. It is important to note, however, that these are broad occupational groupings with a range of training needs within each group.

Figure 11



* Mid-level supply is based on 2002-2003 data.

For example, while the aggregate estimates of supply and demand in education indicate that need is being met, the 2004 Report on Educator Supply and Demand in Washington State[13] released by the Office of the Superintendent of Public Instruction indicates considerable shortage in special education and in a range of administrative/support positions, including speech pathology, occupational and physical therapy, and school psychology. Some shortage is indicated in 21/36 teaching areas and most administrative areas.

A review of the degree/occupation matrix (see Appendix G) shows the association between academic programs and employment in occupations. Based on the matrix data, demand in engineering, software engineering, and architecture would best be met through increased enrollments in engineering. Demand in computer science would best be met through increased enrollments in computer and information systems. Close to half of the need in medical professions was due to training needs for nurses, so increases in nursing programs would be recommended, as would increases in other health-related programs.

Positions in editing, writing, and performing are most commonly met by graduates of humanities programs. Humanities program graduates are the largest group included in this analysis and are distributed broadly across a number of other occupational areas. The growth indicated in editing, writing, and performing occupations is not expected to outpace continued growth of humanities programs resulting from overall system growth. Growth in human and protective service occupations rely most heavily on graduates of social science programs. Social science programs have not grown substantially in the number of graduates over the past three years and growth in specific majors may be warranted to meet employer needs, especially in social work and protective service professions. Finally, preparation for the research and science occupations is generally met through programs in life sciences, physical sciences, and social sciences. The gap in research and science occupations may be exacerbated over time by flat growth in baccalaureate degrees in life sciences and social sciences and declines in graduate degrees in math, physical science, health, and engineering.

Training needs in health care are significant at all levels. For example, nursing education is in high demand at the entry level (predominately provided at the associate degree level, but also substantial numbers of new nurses receive initial training at the baccalaureate level) but there is also need for students to continue on for master's and doctorate degrees in nursing to train the next generation of nurses. A recent report from the health care personnel shortage task force indicates high levels of need and difficulty hiring qualified workers in a wide range of health care occupations at all educational levels.[14]

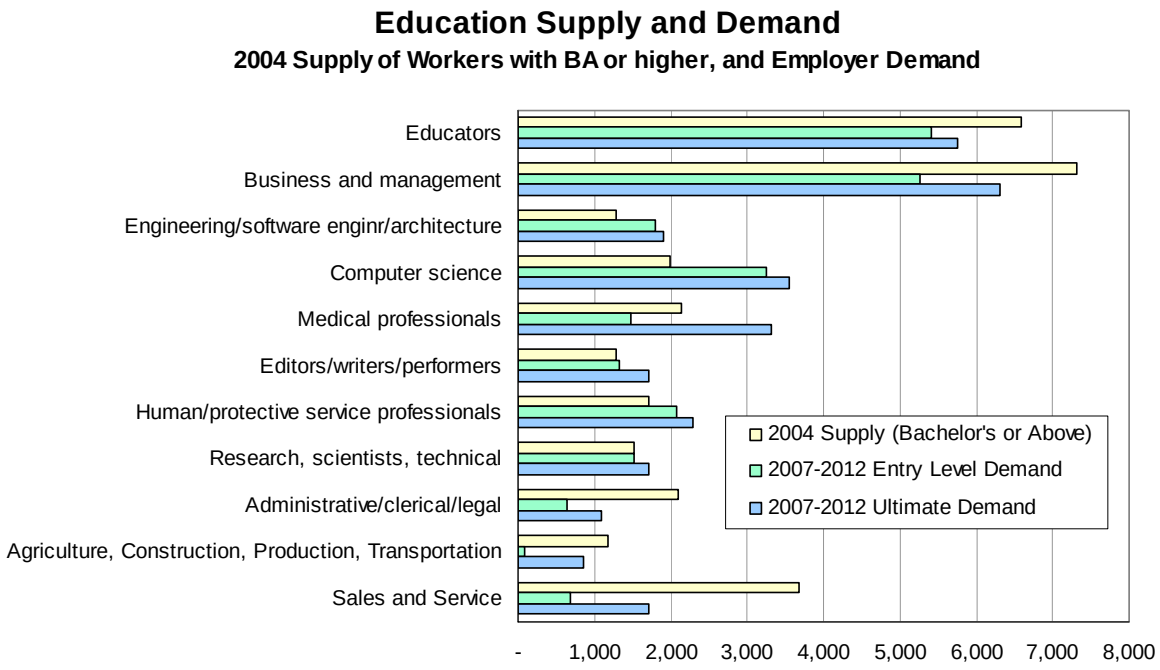
Finally, it is important to note that each occupational area may have specific training needs. The analysis above indicates the most common academic training area for occupations that exhibit a

[13] 2004 Report on Educator Supply and Demand in Washington State released by the Office of the Superintendent of Public Instruction.

[14] Progress 2004: A Report of the Health Care Personnel Shortage Task Force. Workforce Training and Education Coordinating Board.

gap between the supply and demand for trained workers. However, up to half the training needs for positions in these occupations may occur in academic programs other than those listed. For example, while 58 percent of computer/information systems graduates entering the workforce find employment in computer science, they make up only 26 percent of the entering workforce in that field. At the same time, nine percent of business/management graduates take jobs in computer science and make up 24 percent of the entering workforce in that occupation (see Appendix G).

Figure 12



Community Demand

Community demand is the demand for institutions, degrees, or programs expressed by communities. Assessment of community demand allows for consideration of elements not included in the above projections, such as economic development plans in a given region or community, arrival or departure of major industry or employer, new technology, or other developments that may not be readily picked up in the projections described above.

The Department of Community, Trade and Economic Development (CTED) identifies strategic economic development goals for the state. The selection process involves analysis of research on industry developments in Washington, local economic development goals, and an assessment of where CTED resources would be most effective. Local workforce development areas also set goals for economic development within the region. These are discussed in the regional profile section of this report.

The industries identified as the focus of statewide economic development activities include value-added agriculture, wood products, technology, aerospace, tourism, biotechnology, and marine services.

The occupations associated with growth in a number of these industries would require training through programs that are, in many cases, in very short supply. Specifically, the need for workers with training in engineering and computer science would be essential for growth in aerospace and technology occupations. Biotechnology relies heavily on the strength of the research infrastructure which would include research universities and other publicly and privately funded research centers for basic research. In addition, the industry relies heavily on significant numbers of workers with strong background in math and science.

It is important to note that all fields are becoming more complex and require workers prepared with higher levels of education than in the past. For example, in the wood products industry, a key area for growth is in engineered wood products. Development of these products and manufacturing processes requires higher levels of education than traditionally associated with the industry. In addition, there is a continuing trend toward the development of new harvesting techniques to comply with regulatory issues. This, too, has an impact on training needs.

A similar trend exists in value-added agriculture where additional training is required to efficiently produce the raw materials for production and to develop ways to add value and effectively market products. A key example in Washington is the development of wineries throughout the state that rely on Washington-grown grapes. The wineries not only add value by providing a much higher economic benefit to the state than would be realized by simply producing and exporting grapes, but wineries also have a spin-off benefit through increased tourism.

While health care is not included as an area of focus for economic development, it is cited as a key area of growth.[15] As discussed in earlier sections, training needs in health care are significant at all levels. For example, nursing education is in high demand at the entry level (predominately provided at the associate degree level, but also substantial numbers of new nurses receive initial training at the baccalaureate level), but there is also need for students to continue on for master's and doctorate degrees in nursing to train the next generation of nurses. A recent report from the health care personnel shortage task force indicates high levels of need and difficulty hiring qualified workers in a wide range of health care occupations at all educational levels.[16]

[15] Cluster Strategies for Washington: Report for the Office of Trade and Economic Development. Paul Sommers, December 2001. A detailed analysis of needs in health care is provided in "Progress 2004: A Report of the Health Care Personnel Shortage Task Force."

[16] Progress 2004: A Report of the Health Care Personnel Shortage Task Force. Workforce Training and Education Coordinating Board.

The University of Washington, with funding from the Sloan Foundation, conducted a series of surveys and interviews to assess the demand for degrees and programs in Washington state.[17] As part of the study, researchers interviewed community and business leaders around the state about economic development and educational opportunities for Washington colleges and universities. The interviews were designed to provide information on new and emerging areas of statewide economic development, determine the level of education and skills required to support this development, and assess the scope of new employment opportunities that might result.

The interviews indicated a concern that the market is becoming increasingly competitive, resulting in consolidation and increased attention to efficiency. In response, employers report that they have become more selective in the hiring process. Workers with a deeper and more sophisticated skill set are at a distinct advantage in this environment. Ideally, workers would develop a mix of technical skills and management, communication, and team work skills. This is consistent with findings reported in the 2004 employer survey conducted by the Workforce Training and Education Coordinating Board which finds that employers reporting difficulty finding qualified applicants most often cite lack of occupation-specific skills and/or lack of problem-solving and communication skills or positive work habits and attitudes.

According to UW study participants, a number of occupational areas are also facing significant retirements in the coming years. This is a special concern in government, education, health care, and engineering professions.

The study identifies health care and education as two key areas that will experience significant levels of new hiring due to a combination of growth and replacement of departing workers. In education, the need is most pronounced in special education, speech pathology, and school psychologists. Retirements will also significantly increase the need for administrators in the K-12 system.

Real estate, construction, and related finance occupations were also identified as key growth industries. This growth will primarily affect higher education in the need for additional training in architecture, engineering, construction management, economics, and finance. An additional impact on many of these programs will come from continuing population growth and economic development which will drive additional needs in transportation and urban planning.

Other areas that will impact higher education training needs would be an increased need for training in accounting, resulting from new reporting regulations. Developments in high technology will focus primarily in computer security and technology commercialization, requiring additional training in computer science and business.

[17] Private and Public Leader Interviews On Economic Development and Education Opportunities for Washington State Universities and Colleges. Draft report prepared by Ryan Landtroop, University of Washington. July 2005.